Soils of Northwest Ohio/Soil Health

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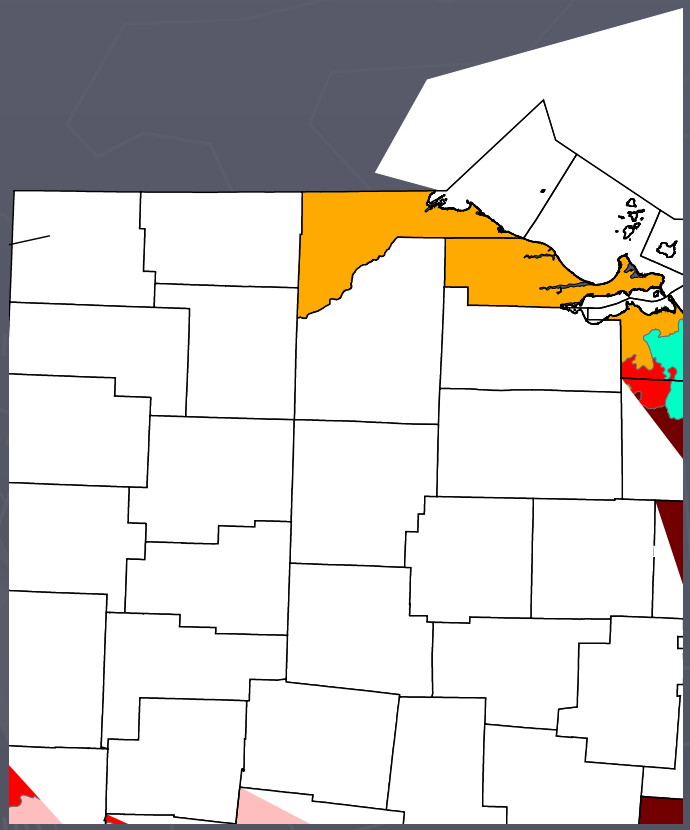
Soils Presentation

- Overview of Northwest Ohio Soils
  - How they formed
  - Major physical characteristics
  - Extent
- Soil Health/Soil Quality
  - What is soil health/quality
  - Importance of soil health/quality
- How Management Affects Soil Health in Northwest Ohio.

MLRA 99 – Erie-Huron Lake Plain



- Soils are typically very deep, somewhat poorly to very poorly drained. Contain lacustrine deposits, and dense till.
- Common soils of this area are Hoytville, Nappanee, Paulding, and Toledo.

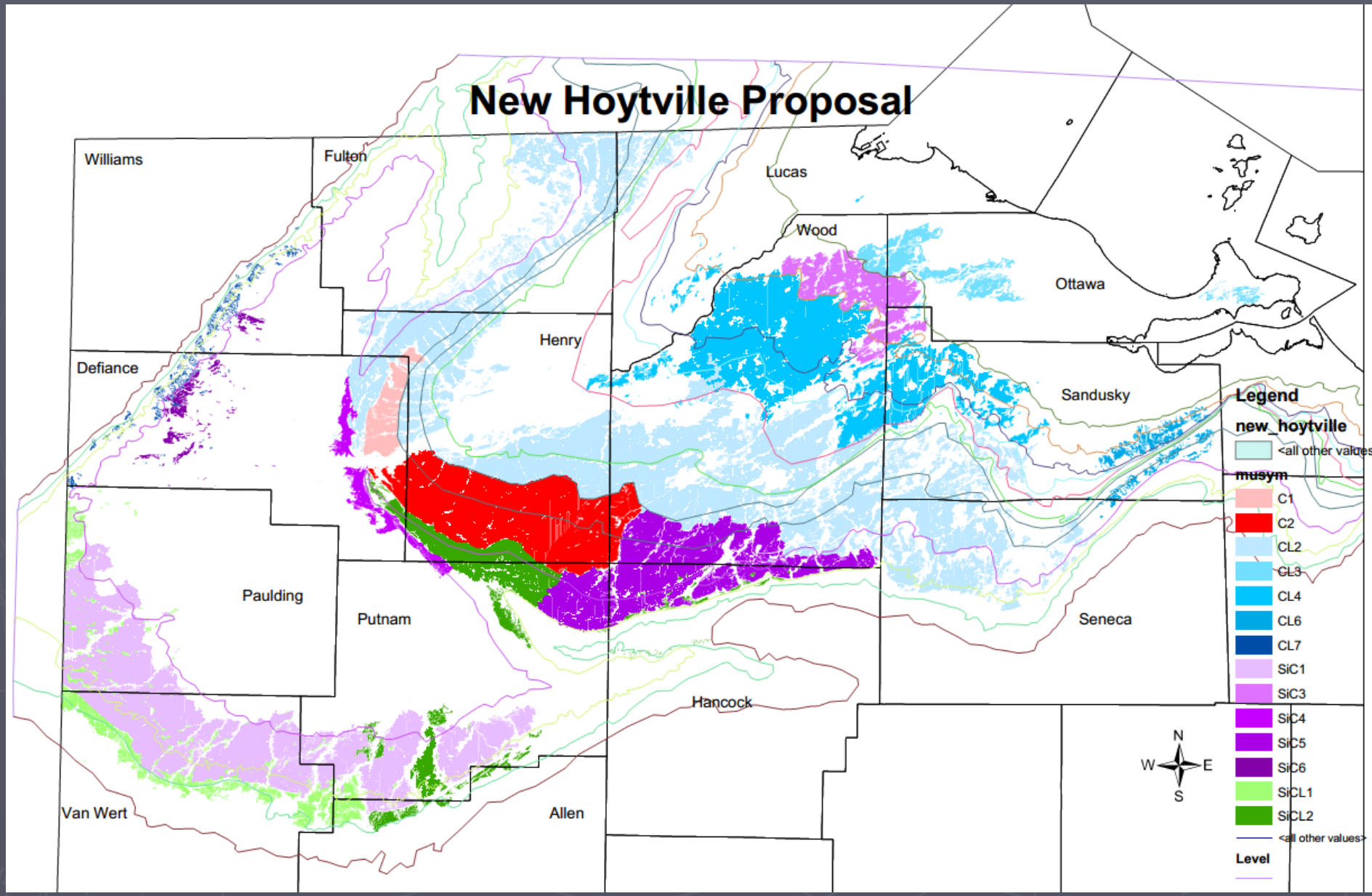
Soil Formation of NW Ohio

- As the glacial ice was receding for the last time, the Erie Basin was filled by a series of different lakes that formed in front of the ice sheet. For a few thousand years, lake levels varied in these lakes as drainage outlets were blocked or opened by the fluctuating ice front of the last glacier.

Lacustrine (Lake Sediment) Formation

- Lacustrine Deposits – Material deposited in lake water (still), and exposed when the water level is lowered. Sand-Silt-Clays

- Lake Plain – A nearly level surface marking the floor of an extinct lake filled in either by well sorted stratified sediments or by the reworking of existing sediments as a result of wave action.


New Hoytville Proposal
Williams
Fulton
Lucas
Wood
Ottawa
Henry
Defiance
Sandusky
Paulding
Putnam
Seneca
Hancock
Van Wert
Allen
Legend
new_hoytville
<all other values>
musym
C1
C2
CL2
CL3
CL4
CL6
CL7
SiC1
SiC3
SiC4
SiC5
SiC6
SiCL1
SiCL2
<all other values>
Level
N
W
E
S

Typical Soil Properties

- Heavy Clay (40-60%) at or near the surface.
  - Resulting in decreased permeability
- 0 to 1 percent slopes/Depressional areas
- Very poorly and poorly drained

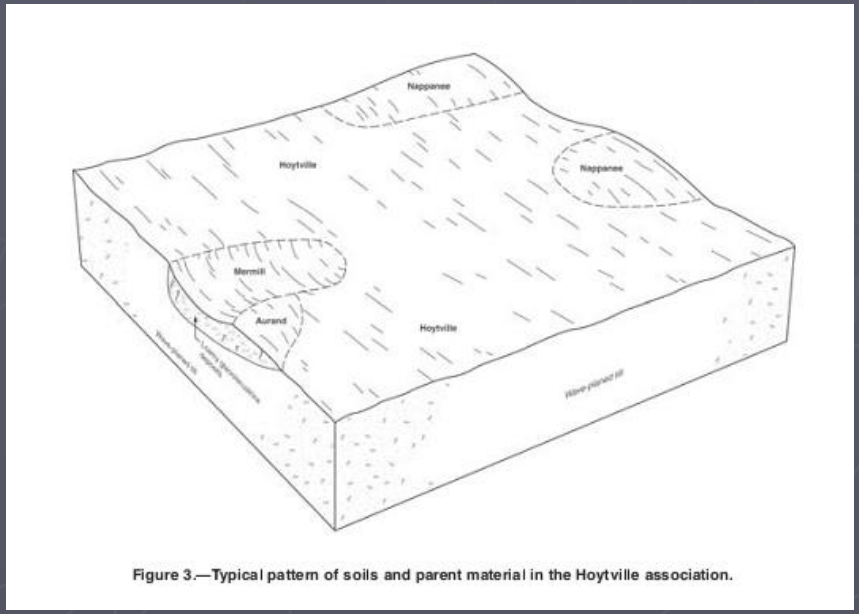


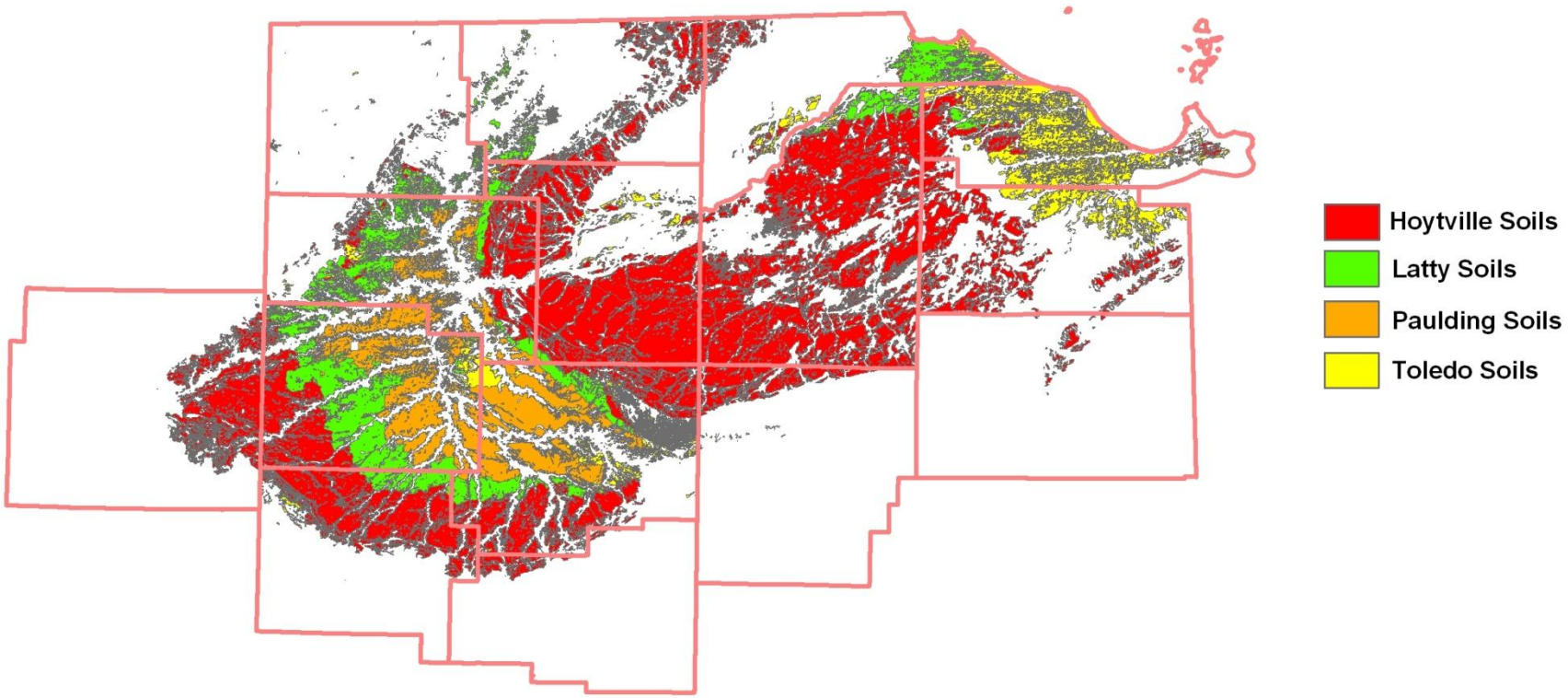
Figure 3.—Typical pattern of soils and parent material in the Hoytville association.


0
20
40
60
80
1
20
40
60

Four Similar Soil Types

- Hoytville – 871,866 acres of drainage area
- Latty – 191,716 acres of drainage area
- Paulding – 166,893 acres of drainage area
- Toledo – 152,490 acres of drainage area
- Total of ~1.4 million acres

Extent of Very Poorly Drained/Heavy Clay Soils in NW Ohio



Runoff/Highly Erodible?

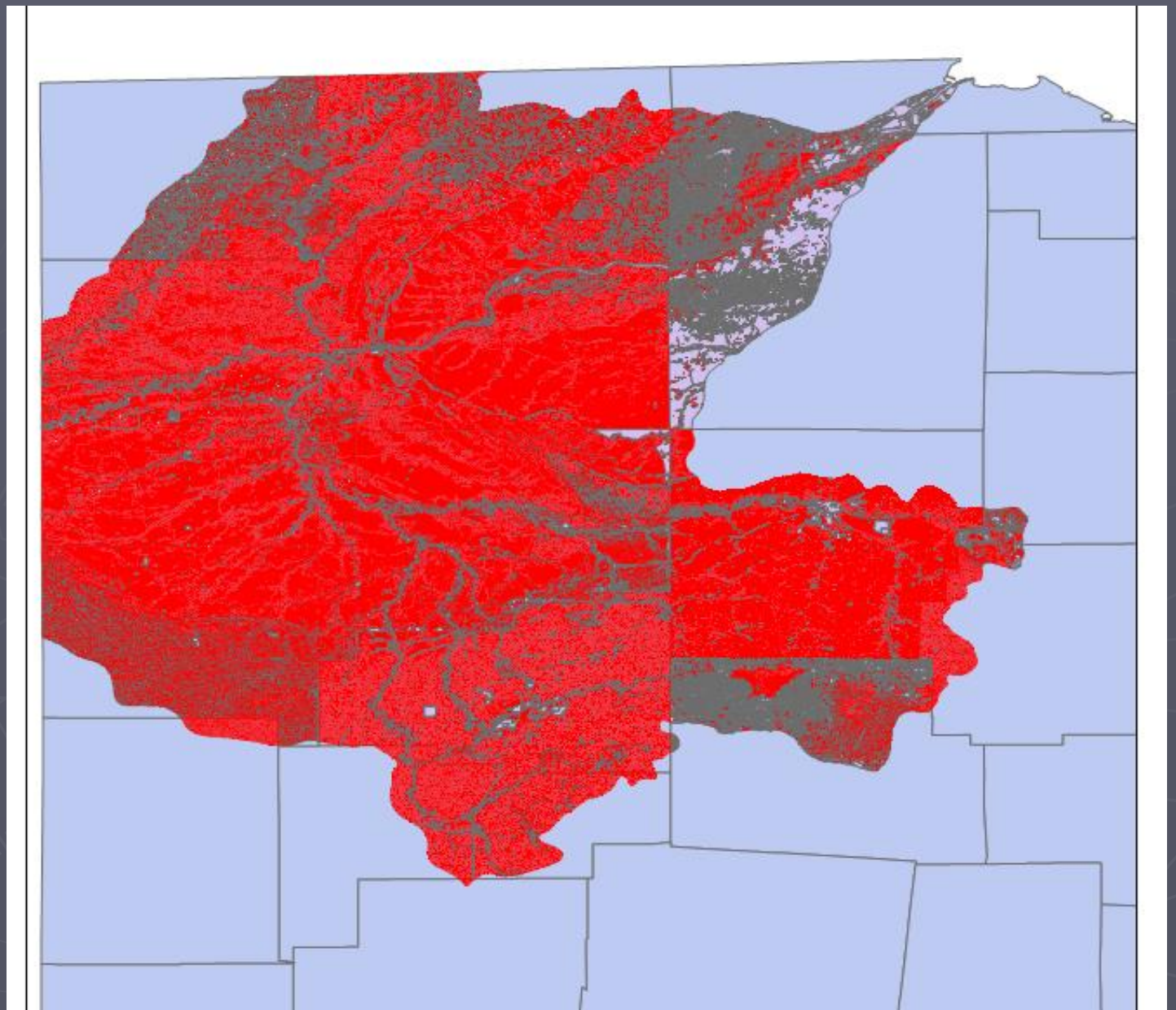
- Are flat areas prone to runoff?

- Hydrologic soil groups assigned during soil survey process.
  - Based on measured rainfall, runoff, and infiltrometer data.

Hydrologic Soil Group Rating

- Group D—Soils in this group have high runoff potential when thoroughly wet. Water movement through the soil is restricted or very restricted. Group D soils typically have greater than 40 percent clay, less than 50 percent sand, and have clayey textures. In some areas, they also have high shrink-swell potential.

Hydrologic Soil Groups



Soil Quality/Health Background

- Definition of Soil Quality
- Aspects of Soil Quality
  - Inherent soil property indicators
  - Dynamic soil property indicators
- Importance of Soil Quality

Definition of Soil Quality/Health

"the capacity of a specific kind of soil to function, within natural or managed ecosystem boundaries, to sustain plant and animal productivity, maintain or enhance water and air quality, and support human health and habitation."

Aspects of Soil Quality

- Inherent Soil Quality
  - Results from natural soil forming processes and factors
  - We have no control over inherent properties, "It is what it is"
- Dynamic Soil Quality
  - Changes due to human use and management
  - We can change or altar management styles to better certain aspects of dynamic soil quality

Inherent Soil Property Indicators

- Horizon
- Horizon depth
- Color
- Texture
- Structure
- Consistency
- Root presence
- Redoximorphic features
- Ped and void surface features
- Rock fragments
- Horizon boundary

Dynamic Soil Property Indicators

- Organic Matter
- Bulk Density
- Infiltration

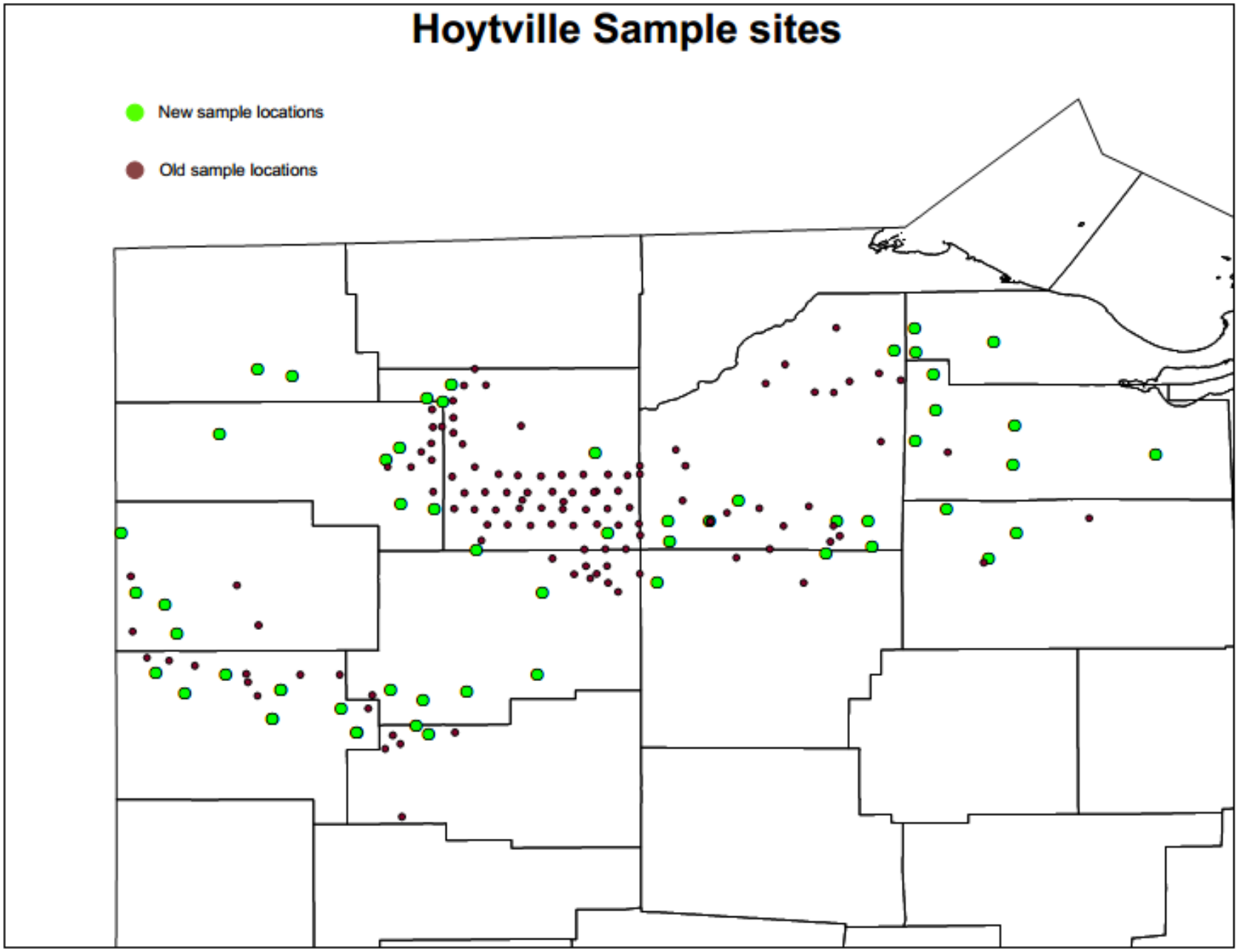
Organic Matter

- Soil organic matter is a core indicator of soil quality.
- High organic matter leads to higher cation exchange capacity, (ability to attract, retain, and exchange element)

Organic Matter of NW Ohio

- Organic matter was looked at closely in 2006 during update of Hoytville
- 132 samples taken for organic carbon.

Hoytville Sample sites



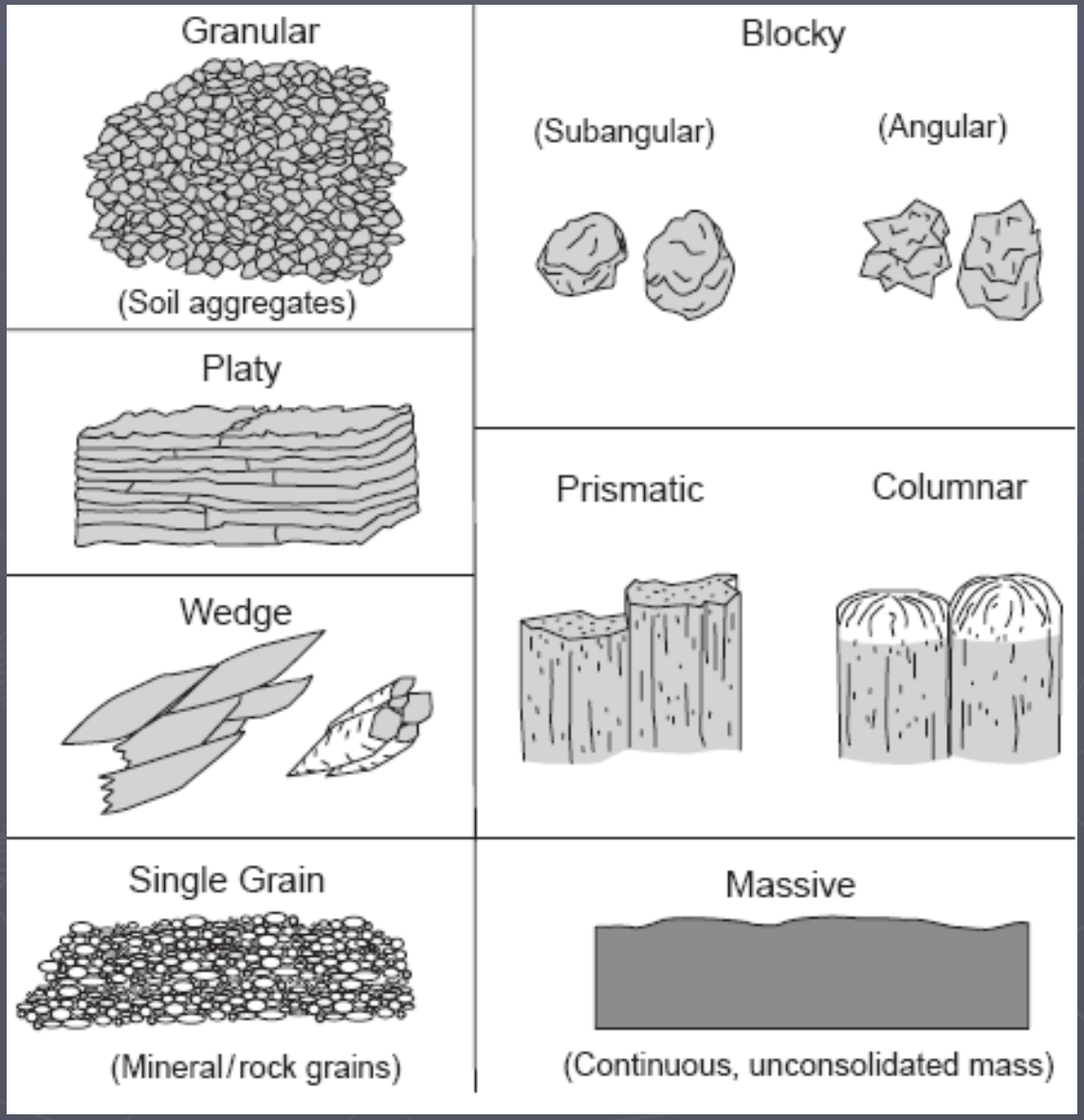
Organic Matter of 3 soils

- Hoytville – Low 2.06%, High 9.1%, RV 4.6%
  - 132 samples
- Paulding – Low 2.9%, High 8.01%, RV 5%
  - 23 samples
- Toledo – Low 3.3%, High 8.45%, RV 4.4%
  - 26 samples

Bulk Density

- Bulk density is the weight of soil for a given volume, and is used to measure the level of compaction.
- Compaction is an important indicator of soil quality because the greater the density, the less pore space that is available for water movement, root growth and penetration, and seedling germination.
- Higher bulk density = higher runoff/little to no filtering capacity.

Structure Types

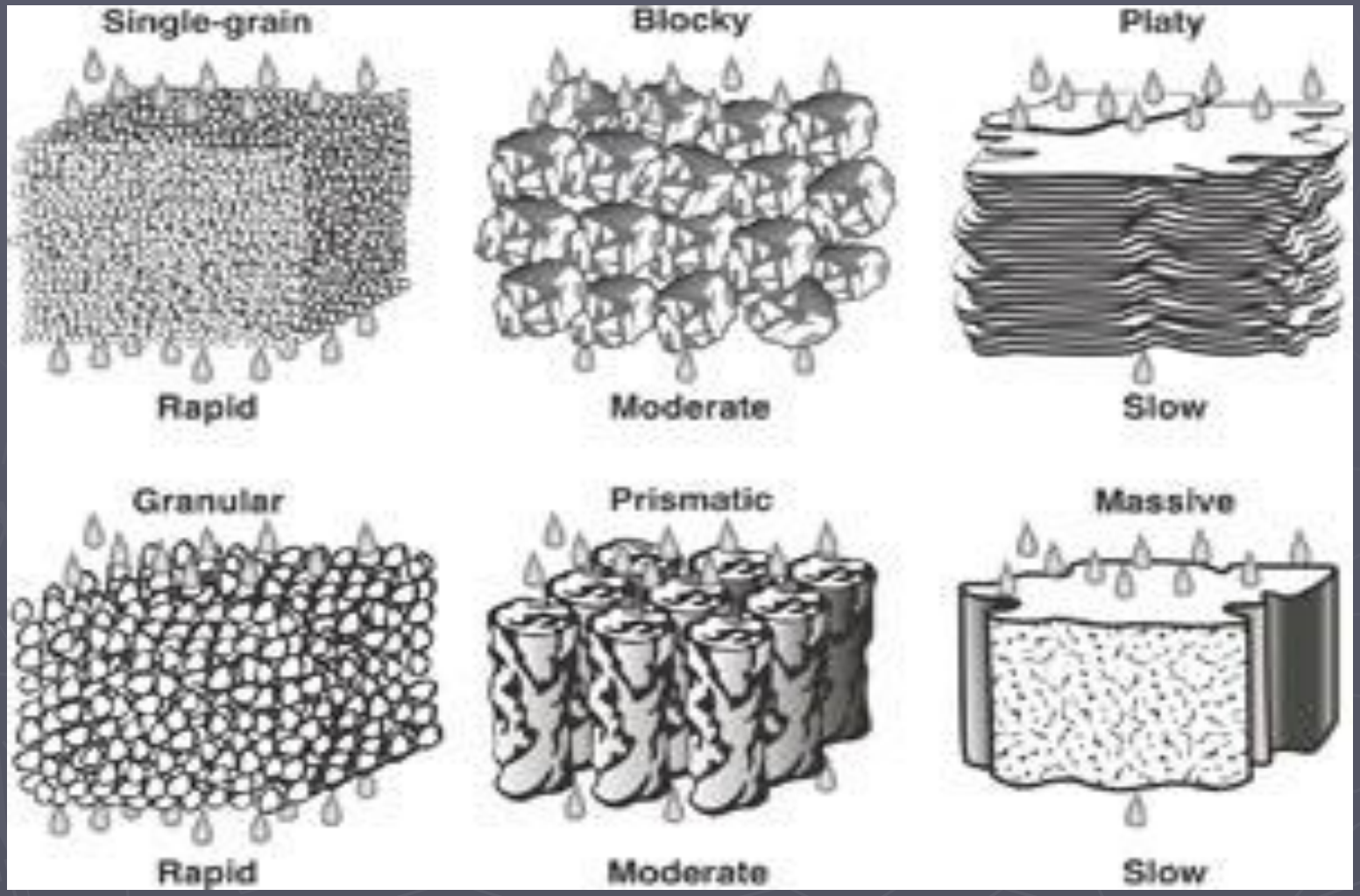


Infiltration

- Infiltration is a measure of how fast water enters soil from the surface. Good infiltration is important to soil quality because water that enters the soil too slowly may lead to ponding, or erosion from surface runoff.

- Poor infiltration will NOT allow proper soil filtering to take place.

Infiltration



Importance of Soil Quality

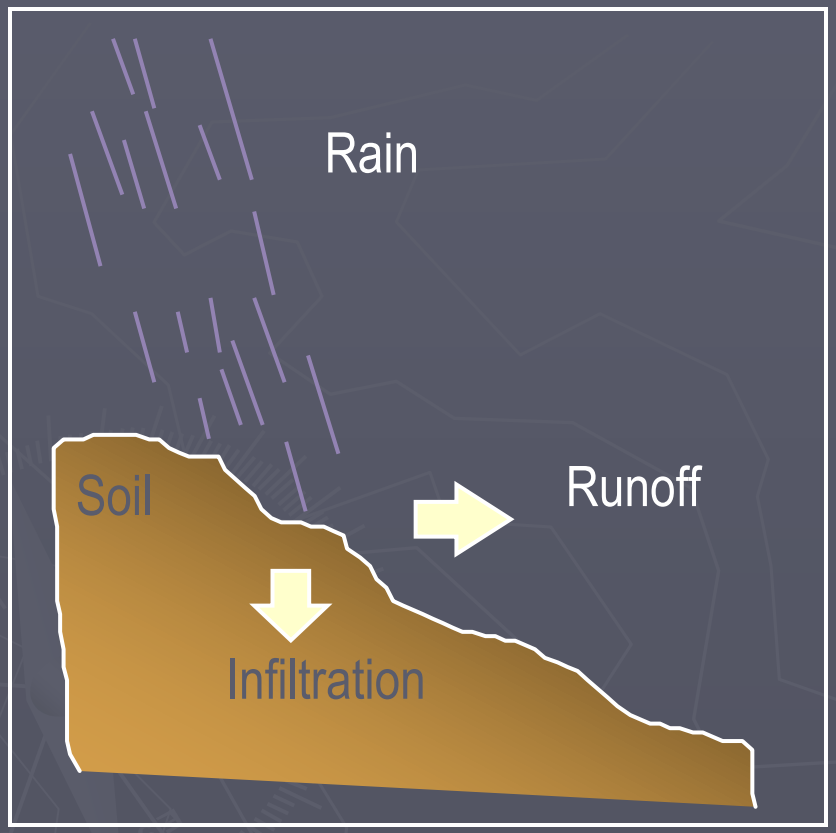
Healthy Soils

- Cropland Enhancement
  - Cropland productivity is threatened by erosion,decreasing soil organic matter, invasive species, and variability in weather patterns and water availability
- Economic Impacts

Damaged Soils

- On Site
  - Loss of productivity
  - Higher cost of production
  - Inconsistent response to management
- Off Site
  - Impairs water quality
  - Impairs air quality

Soil Quality is Water Quality



Affects of Management on NW Ohio Soils Health

- No-till?
- Tillage?

- **Pros and Cons with everything.**

NW Ohio Soils are Very FRAGILE!

- Meaning soil health can be severely compromised with 1 management decision

MANAGE WHEN

20 Years Continuous No-till

20 Years Continuous No-till

What about tillage?

Photo Rural Energy Marketing

- Increased erosion and sedimentation issues
- Potential for compaction?

Tile Risers

5 Years of No-till, with CC and RTK

5 Years of No-till, with CC and RTK

Possible Tools in the Toolbox

Photo from Sears

Cover Crops

RTK, Controlled Traffic

Photo Sloan Implement

Strip Tillage

Photo MFA Inc.

Specialty Tools?

Photo from Snap-on

Questions?

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